THE NUTRITIVE VALUE OF ALFALFA HAY IN SOME DAIRY COW FARMS FROM MOŢCA VILLAGE (IAŞI COUNTY)

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Abstract

The alfalfa hay represents an important fodder in dairy cows feeding both in winter and grazing time.

In this study we focused on the dynamics of the basic indexes of nutritive and energetic value of alfalfa hay used in dairy cows diet from some small farms from Moţca village. The alfalfa hay samples were collected from the dairy farms which participated in a dairy cows feeding improvement research. The alfalfa hay samples were analysed using the classical schema of Proximate Analysis.

The crude chemical content of alfalfa hay among farms had a low variability. The average values for all three farms were 878.12 g DM/ kg of hay, 159.04 g CP/ kg DM, 23.55 g EE/ kg DM, 363.67 g CF/ kg DM, 366.52 g NFC/ kg DM. The highest level of CP was recorded in Bechir Elena farm (2005-1st cycle) and Zaharia Maricica farm (2007- 2nd cycle) when alfalfa hay was harvested in the phase of before budding. The lowest level of CP (and highest of CF level) was recorded in Andriesi Viorel farm (2004- 2nd cycle) when the alfalfa was harvested in an advanced vegetation phase.

The values obtained for ENL varied between 1049 and 1158 kcal/ kg DM (0.62- 0.68 UFL/ kg DM) and the ones for ENV varied between 940 and 1068 kcal/ kg DM (0.52- 0.59 UFC/ kg DM). The protein content had a low variability between the three farms. The PDIN values were 83- 114 g/ kg DM and the ones for PDIE varied between 82- 96 g/ kg DM.

The nutritive values of the alfalfa hay used in the studied dairy cow farms from Moţca village has similar and in some cases lower values than the ones presented by the specific literature for this fodder.

Key words: alfalfa hay, chemical composition, nutritive value

INTRODUCTION

Drying green fodders represents one of the most used fodder conservation methods for the winter time. Hay is a basic fodder in ruminant feeding, seldom being used as unique fodder during the winter time when animals can not be fed with green fodder.

In many small dairy farms, hay covers up to 40% of energy requirements and over 50% of protein requirements in cows feeding; and it is a good source of minerals and vitamins, especially in winter time [3].

In this study we focused on the dynamics of the basic indexes of nutritive and energetic value of alfalfa hay used in dairy cows diet, especially during the winter time, in some small dairy farms from Moţca village, Iasi county.

In practical experiments was demonstrated that using 6- 7 kg of alfalfa hay and 30- 35 kg of silo it can be obtained a milk production of 15 kg/ day/ cow with only a concentrate consumption of 140- 150 g/ kg of milk [2].

MATERIAL AND METHOD

Alfalfa hay samples were collected with the purpose of determining the nutritive value to calculate the dairy cow's diet in an optimisation feeding research.

Alfalfa hay samples were collected from 3 dairy farms which took part in this research in Moţca village. The raw samples were taken from every location and analysed in the laboratory of "Animal nutrition and feeding" department, Faculty of Agriculture, Iaşi.

The analysis of the alfalfa hay from the energetic and protein point of view took into account the following indexes ENL, ENV, UFL, UFV PDIE and PDIN using the

specific equations for the nutritive value estimation proposed by French system [4]:

Table 1 Equations for assessing the energy value of the alfalfa hay

Index	Equation
Digestible energy	ED= EB*dE
Metabolic energy	EM= ED*EM/ED EM/ED= 0,8417- 9,9*10^{-5} CFo- 1,96*10^{-4}CPo + 0,0221NA
The fodder concentration in metabolic energy	q= EM/EB
Efficiency of using the metabolic energy in net energy:	
For lactation	kl= 0,60+ 90,24*(q- 0,57)
For maintenance	km= 0,287q+ 0,554
For fattening	kf= 0,78q+ 0,006
For maintenance and meat production	kmf= (km*kf*1,5)/ (kf+0,5*km)
UFL	UFL= EM*kl / 1700
UFV	UFV= EM*kmf / 1820

The digestibility- degradability coefficients used for the estimation of nutritive value were taken from the INRA Tables.

Table 2 Equations for estimating the protein value of alfalfa hay

Index	Equation
PDIA	PDIA= CP * (1,11*(1-TD))*1*dr
PDIN	PDIN= PDIA + PDIMN
PDIMN	PDIMN= CP * [1-1,11*(1-TD)]*0,9* 0,8*0,8
PDIE	PDIE= PDIA+ PDIME
PDIME	PDIME = MOF* 0,145* 0,8* 0,8
SOF	MOF= MOD- CP (1-TD)- CF- FP

Samples preparation

The alfalfa hay samples were dried in the drying closet at 105^0C and mill-grinded. After having had the samples prepared the organic and mineral matters were assessed using the method of Proximate Analysis [1].

RESULTS AND DISCUSSIONS
Chemical composition

The results obtained using the Proximate Analysis are presented in table 3. Analysing the obtained data, one notices that there is a low variability in crude chemical content among the three farms.

Table 3 Crude chemical content of alfalfa hay (g/ kg SU)

Farms	Year	DM	Ashes	CP	EE	CF	SEN
Andrieşi Viorel	2004	864.10	79.16	129.19	20.10	412.41	359.14
	2005	887.07	87.40	157.41	20.97	366.34	367.88
		872.83	89.78	162.00	26.16	345.62	376.55
	2006	861.23	91.19	166.81	23.80	351.94	366.26
		89470	85.35	155.40	24.51	355.69	379.05
	2007	842.13	90.37	167.31	25.25	363.05	354.02
		881.73	80.71	165.05	24.57	353.32	376.34
Bechir Elena	2004	862.80	72.36	161.37	23.64	372.05	370.58
	2005	844.67	86.86	173.48	26.44	370.40	342.82
		887.83	91.80	156.19	23.92	356.67	371.43
	2006	859.00	91.35	157.08	21.19	372.45	357.94
		896.33	92.12	158.27	24.92	361.70	363.00
	2007	889.90	91.62	164.92	22.96	366.11	354.38
		896.13	81.94	156.97	22.76	359.06	379.26
Zaharia Maricica	2004	888.06	83.55	149.58	22.11	369.57	375.20
	2005	864.86	89.07	168.43	23.78	360.67	358.05
		890.46	90.51	158.04	22.83	351.58	377.03
	2006	873.73	89.69	156.53	19.88	368.76	365.14
		897.10	93.19	156.54	25.12	361.83	363.32
	2007	901.96	91.69	162.46	26.16	354.60	365.09
		883.97	81.94	156.91	23.38	363.33	374.45
Media $\overline{X}$ ±s$_x$		**878.12±4.15**	**87.22±1.28**	**159.04±2.08**	**23.55±0.45**	**363.67±3.16**	**366.52±2.30**
s		17.59	5.43	881	1.91	13.40	9.74
CV %		2.00	6.23	5.54	8.10	3.68	2.66
Data presented by INRA (1988)							
C$_1$- budding		850	93	174	-	351	-
C$_1$-blooming		850	85	163	-	374	-
C$_2$- budding		850	87	177	-	361	-
- data are not available							

The dry matter content of the analysed samples varied between 859.00 g and 897.10 g/ kg with an average value of 878.12 g/ kg of alfalfa hay.

The average crude ash content was 87.22 g/ kg DM with limits between 72.36 g and 92.12 g/ kg DM.

The crude protein content varied between 129.19 g and 173.48 g/ kg DM with an average value of 159.04 g/ kg DM. The values we have obtained are lower than the ones presented by the scientific literature (163- 177 g CP/ kg DM). The lowest value was obtained in Andriesi Viorel farm in 2004 (129.19 g CP/ kg DM). This is due to unfavourable climate conditions when the alfalfa was harvested in an advanced vegetation phase, namely complete blooming and after blooming phase. The alfalfa was dried on the ground and the hay was stored into the haystack depot. Thus, a big amount of leaves was lost and the hay was mainly made up of stems, being well known that the highest level of protein is found in leaves.

The ether extract content varied between 20.10 g and 26.44 g/ kg DM, the average value being 23.55 g/ kg DM.

The average of crude fibre content was 363.67 g/ kg DM, with variations between 345.62 and 412.41 g/ kg DM.

The values obtained for NFC were between 342.82 g and 379.26g/ kg DM with an average of 366.52 g/ kg DM.

Metabolizable protein and energy contents

Table 4 presents the results regarding the nutritive value of the analysed samples. The energetic value was similar for the alfalfa hay samples in all the three farms.

Table 4 The nutritive value of alfalfa hay (/ kg SU)

Farms	Year	ENL	ENV	UFL	UFV	PDIN	PDIE
Andrieşi Viorel	2004	1083	979	0.64	0.54	83	82
	2005	1077	972	0.63	0.53	101	88
		1105	1006	0.65	0.55	104	89
	2006	1077	972	0.63	0.55	107	90
		1084	980	0.64	0.54	100	88
	2007	1150	1060	0.68	0.58	107	90
		1114	1013	0.66	0.56	106	91
Bechir Elena	2004	1097	991	0.65	0.54	105	91
	2005	1157	1065	0.68	0.59	113	93
		1076	972	0.63	0.53	105	92
	2006	1049	940	0.62	0.52	105	92
		1077	972	0.63	0.53	106	92
	2007	1146	1056	0.67	0.58	110	95
		1062	952	0.62	0.52	105	93
Zaharia Maricica	2004	1130	1036	0.66	0.57	100	90
	2005	1127	1031	0.66	0.57	113	95
		1076	972	0.63	0.53	106	92
	2006	1049	940	0.62	0.52	105	92
		1052	943	0.62	0.52	105	91
	2007	1103	1003	0.65	0.55	109	93
		1158	1068	0.68	0.59	114	96
Media $\overline{x}$ ±s_x		1098±7.75	996±9.18	0.65±0.00	0.55±0.01	105±1.39	91±0.65
s		35.50	42.05	0.02	0.02	6.37	2.99
CV%		3.23	4.22	3.24	4.34	6.05	3.28
Data presented by INRA, 1988							
C_1- blooming		1139	1056	0.67	0.58	112	94
C_1-flowering		1054	946	0.62	0.52	105	88
C_2- blooming		1139	1037	0.67	0.57	114	94

Thus, the minimum content in ENL was 1049 kcal/ kg DM, whereas the maximum content 1158 kcal/ kg DM. The value of ENV varied between 940 and 1068 kcal/ kg DM.

The highest values were recorded by the alfalfa hay samples from Zaharia Maricica farm in 2007 for the alfalfa hay obtained from the second cycle of vegetation in budding phase.

At the same time, the results of the analysis displays a low variability value of UFL (0.62- 0.68) and UFV (0.52- 0.59) in alfalfa hay samples.

These values are similar and in some cases lower than the ones presented by specific literature (INRA, 1988) for the vegetation stage when they were obtained.

Regarding the protein value, we come to notice that there was a low variability for the analysed samples between farms. Thus, the average of the analysed samples is 105 g PDIN/ kg DM with a variation between 83 and 114 g PDIN/ kg DM.

The average value recorded for the analysed samples of alfalfa hay was 91 g PDIE/ kg DM, with variation between 82 g and 96 g PDIE/ kg DM; in comparison with the data presented by the INRA table which vary between 88- 94 g PDIE/ kg DM.

The highest results were obtained in Zaharia Maricica (2007- 2nd cycle) and Bechir Elena (2005- 1st cycle) farms when the alfalfa was harvested before budding phase.

CONCLUSIONS

Alfalfa hay represents a valuable fodder for dairy cows both in winter and summer time.

Alfalfa hay samples were collected from 3 dairy farms which took part in this research in Moţca village.

The alfalfa hay samples were analysed using the classical schema of Proximate Analysis. The crude chemical content of alfalfa hay among farms had a low variability.

The average values for all three farms were 878.12 g DM/ kg of hay, 159.04 g CP/ kg DM, 23.55 g EE/ kg DM, 363.67 g CF/ kg DM, 366.52 g NFC/ kg DM.

The highest level of CP was recorded in Bechir Elena farm (2005- 1st cycle) and Zaharia Maricica farm (2007- 2nd cycle) when alfalfa hay was harvested in the phase of before budding.

The lowest level of CP (and highest of CF level) was recorded in Andriesi Viorel farm (2004- 2nd cycle) when the alfalfa was harvested in an advanced vegetation phase, namely complete blooming and after blooming phase. The hay was mainly made up of stems.

The values obtained for ENL varied between 1049 and 1158 kcal/ kg DM and the ones for ENV varied between 940 and 1068 kcal/ kg DM. The protein content had a low variability between the three farms. The PDIN values were 83- 114 g/ kg DM and the ones for PDIE varied between 82- 96 g/ kg DM.

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